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APPARATUS FOR DECORATING DINNERWARE AND THE LIKE

Filed April 23, 1946

4 Sheets-Sheet 1

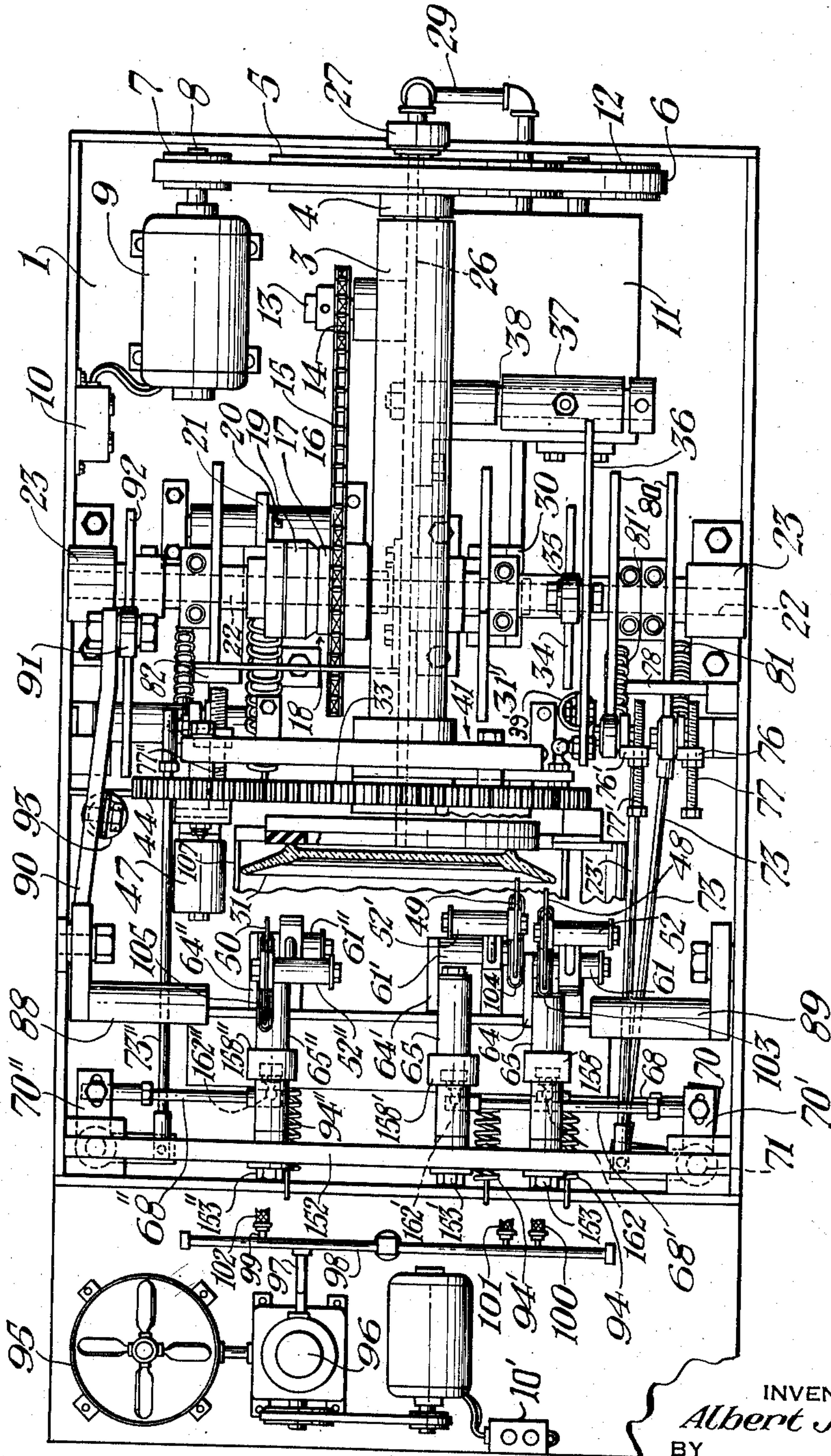


Fig. 1.

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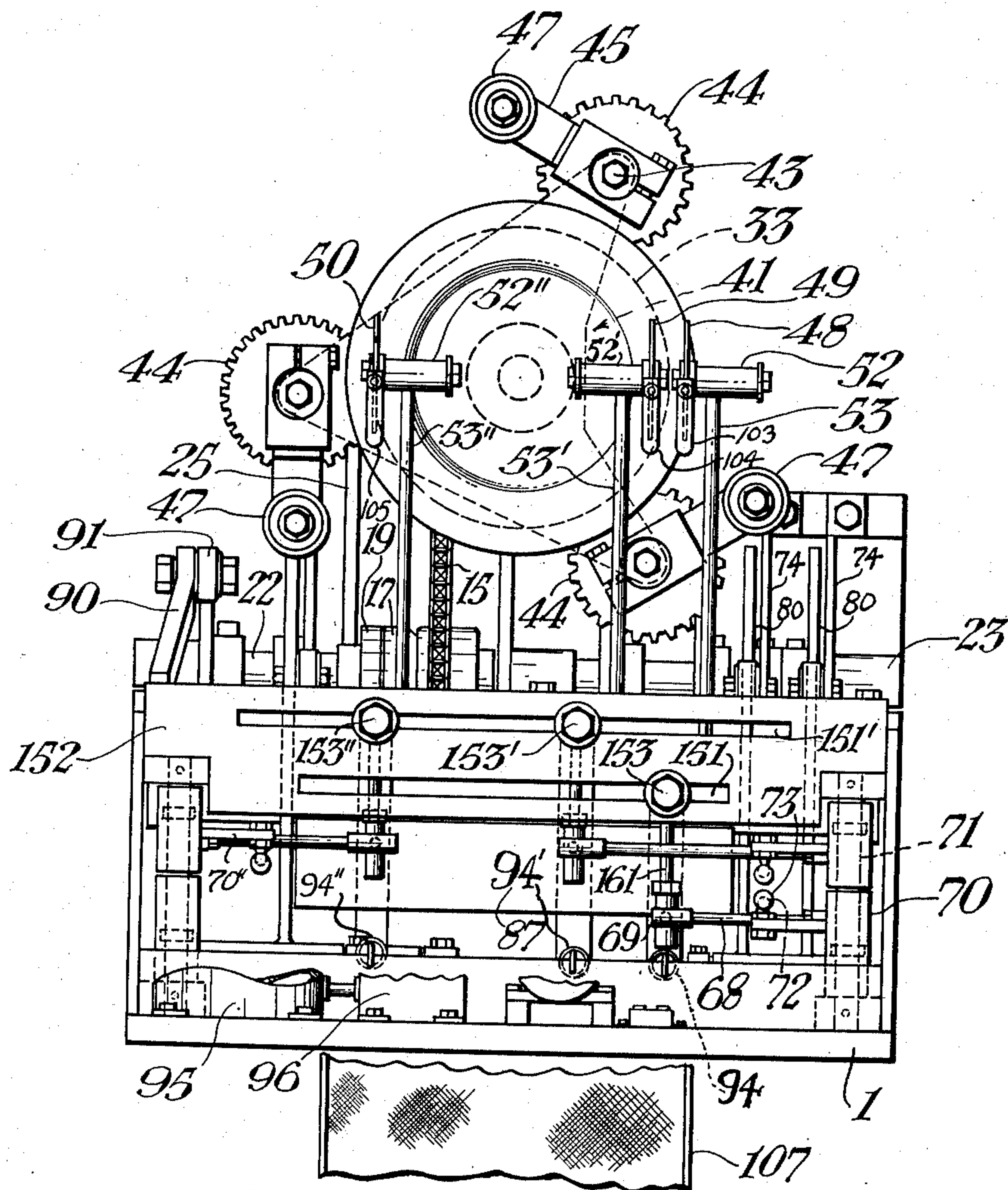


Fig. 2.

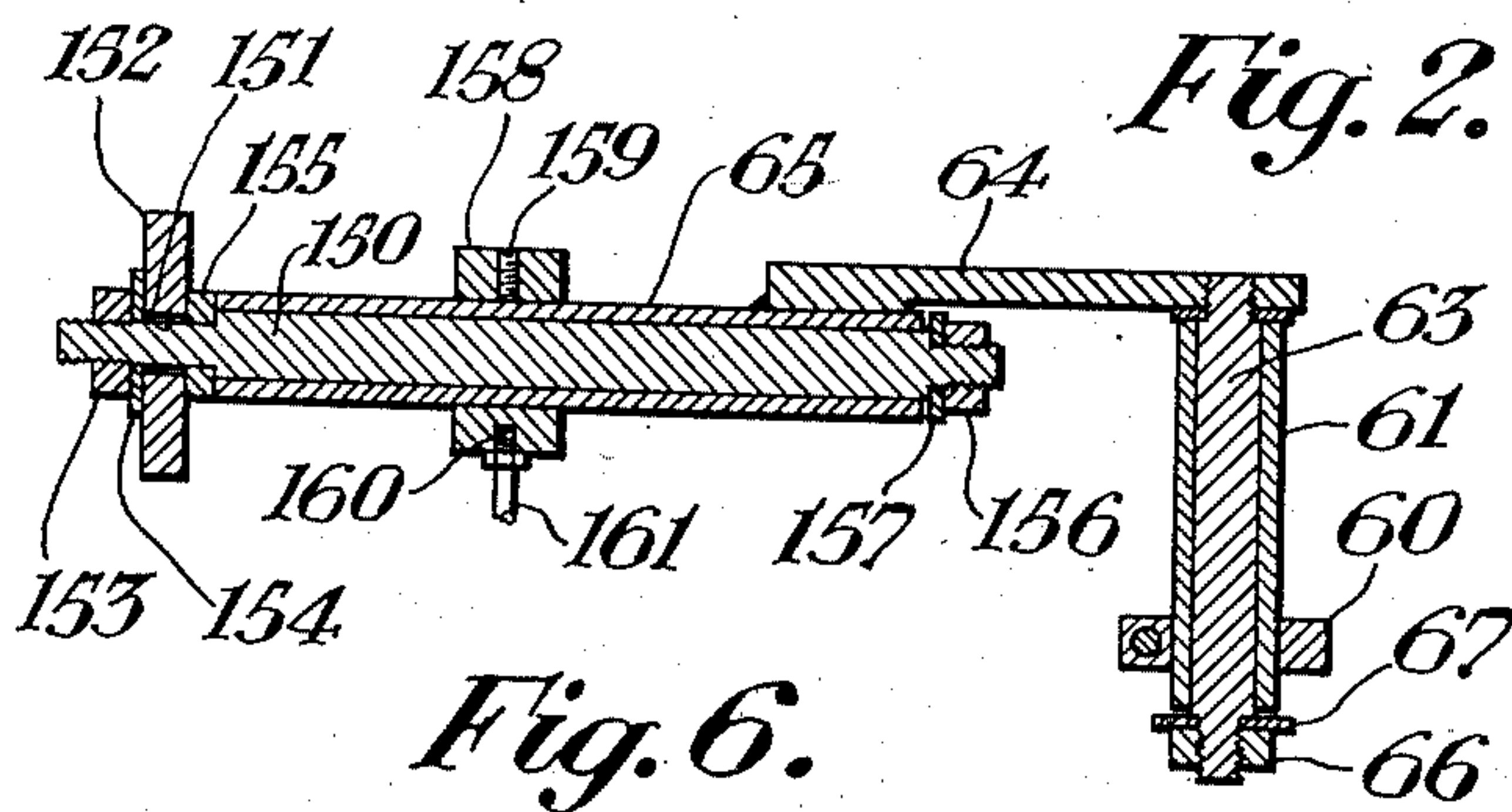


Fig. 6.

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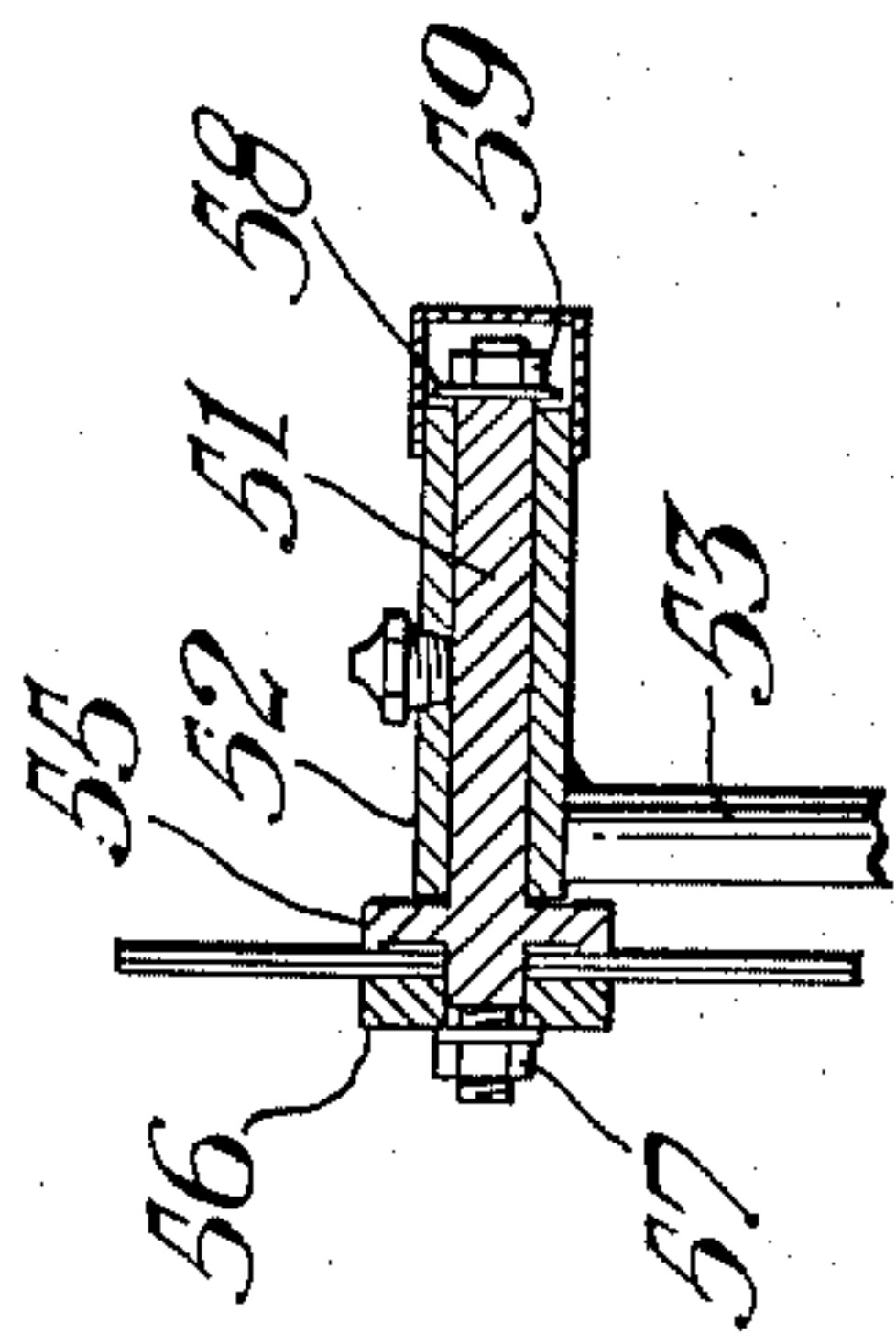
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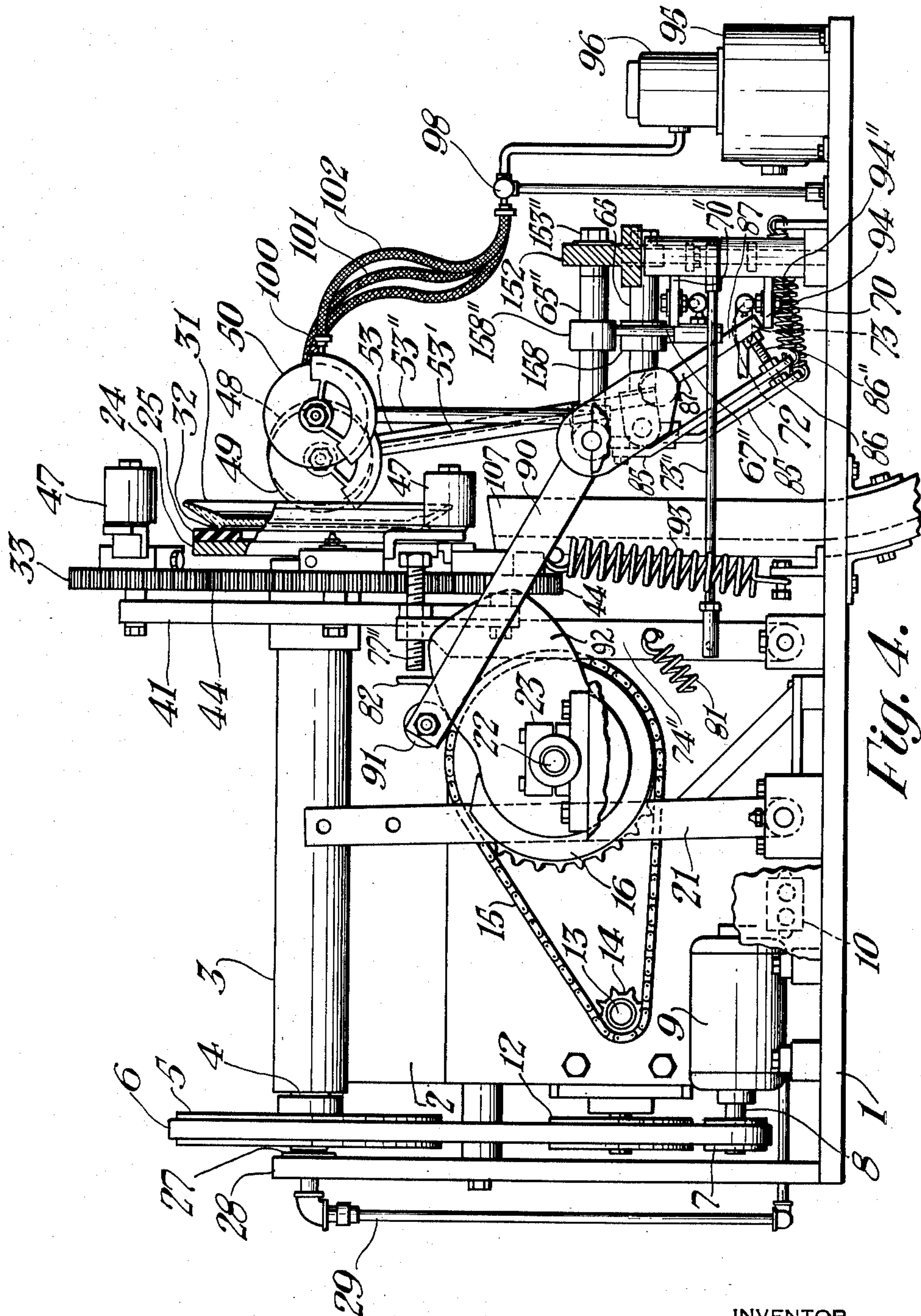


Fig. 4.

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APPARATUS FOR DECORATING DINNER-
WARE AND THE LIKE

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9 Claims. (Cl. 91—12)

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This invention relates to apparatus for decorating dinnerware and the like. It has to do with apparatus for applying single or plural lines, bands, or stripes to the display surface of the ware. The operation is sometimes called "lining" or "banding" or "striping" and apparatus for performing the operation is often referred to as "lining," "banding" or "striping" machinery.

For many years, this form of decoration was applied almost exclusively by skilled artisans who painted the lines on the ware by hand. It was a slow and laborious task and very costly. Great difficulty was experienced in making lines of uniform thickness and in uniformly locating and spacing them apart.

Some efforts have been made recently to perform the operation mechanically. This has resulted in some reduction in cost and the production of a more uniformly decorated product; however, the machinery has been cumbersome and complex and expensive to construct and maintain. For another thing, those machines capable of plural lining operations have, for the most part, required separate stations for performing the several operations.

Some of the objects of this invention are to provide an improved mechanical striping machine that is simple in construction and operation, that lines the ware automatically at a single station, centers the ware before it is lined and is capable of making plural lines of the same or varying width and of the same or contrasting colors simultaneously. Another object is to provide a compact, unitary, manually controlled machine having a high production capacity.

In accordance with this invention, the machine has a single ware supporting chuck adjacent to which are mounted a plurality of applicators, each independently supported and actuated. Said applicators are adapted to be moved inwardly toward and outwardly away from the surface of the ware by improved automatic means and also to be moved in a direction to cause the widening of a band, line or stripe automatically when in engagement with the ware. Furthermore, the machine is manually controllable with respect to starting the same and upon the completion of a ware decorating cycle is automatically stopped and the finished piece automatically discharged.

Other objects and advantageous features will be noted in the accompanying written description and drawings wherein like reference characters designate corresponding parts and wherein:

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Figure 1 is a plan view of the preferred form of lining machine.

Figure 2 is a front elevation of the machine as it would appear when viewed from the left of Figure 1.

Figure 3 is a right side elevation of the machine.

Figure 4 is a left side elevation of the machine.

Figure 5 is a detail in section of the banding wheel shaft and associated support.

Figure 6 is a detail in section of a part of the banding wheel supporting and actuating apparatus.

With reference to Figures 1 to 4 inclusive, 1 is a base plate on which the machine is assembled. Mounted on the base is a shaft housing 2 having an elongated horizontal bearing 3 on the top thereof in which a continuously rotating horizontal chuck shaft 4 is received. Said shaft has a drive pulley 5 fixed on one end thereof to be driven by a belt 6 connected to a pulley 7 secured to the shaft 8 of a drive motor 9 controlled by manual switch 10. On the opposite side of the housing is a gear box 11 containing a reduction gear drive (not shown) driven by a pulley 12 also connected to belt 6. A power take-off shaft 13 extends from the gear box through the lower side of housing 2 and has a sprocket 14 fixed thereon which drives a chain 15 connected to a sprocket 16 attached to the driving disc 17 of a conventional single revolution clutch 18. The driven member 19 has a projecting pin 20 to be engaged by a vertical control lever 21 pivoted on the base 1, thereby to disengage the clutch. Said clutch is mounted on intermittently rotated cam shaft 22 with the driven member 19 secured to said shaft and the driving member 17 rotating freely thereon. Said shaft is supported by pedestal bearings 23 mounted on opposite sides of the base. The shaft extends through a hole in housing 2 and has several operating cams mounted thereon whose function and purpose will be hereinafter explained.

Chuck shaft 4 has a ware chuck thereon in the form of a circular disc 24 fixed on the end opposite pulley 5. The disc diameter is greater than the diameter of the largest foot ring of ware to be decorated. Cemented or otherwise secured to the face of the disc is a pad of resilient material 25, preferably rubber or rubber like composition. Since the ware to be decorated is to be gripped to the cushion surface provided by the pad 25, means are provided whereby this may be accomplished by vacuum. To this end, shaft 24 is

bored lengthwise through the center to form a passage 26 which registers at the chuck end with center holes in the disc 24 and pad 25. At the pulley end, a conventional form of rotary shaft seal 27, Figure 4, is supported on an upright 28 and connects the passage 26 in airtight leakproof relation with a stationary vacuum pipe 29 leading to a vacuum valve 30, Figure 1, operated by a cam 31' fixed on cam shaft 22. Said valve is connected with a source of vacuum (not shown), by pipe 29'. When a plate 31 or the like to be decorated is pressed against the pad 25, the foot ring 32 forms a seal with the pad to thereby make the vacuum effective to hold the plate in position on the chuck.

To center the plate on the chuck, there is provided a centering apparatus comprising a circular gear 33 mounted on shaft 4 between the ware chuck and the forward end of bearing 3. This gear is freely rotatable on said shaft and is turned in one direction or the other by a cam 34 (Figure 31) fixed on cam shaft 22. Said cam engages a cam roller 35 rotatably secured to a lever 36 having a cross bearing 37 fixed to the rear end thereof that is sleeved on a fulcrum pin 38 secured in the side of the housing 2. The free end of lever 36 is connected by a toggle rod 39 to a bar 40 bolted or otherwise secured to gear 33. Thus, when lever 36 is raised by the cam, the gear is caused to turn in a counterclockwise direction and in a reverse direction when the lever is lowered, by spring 39' (Figure 13).

Fixed on the projecting end of shaft bearing 3 at the chuck end is a spider 41 (Figures 2 and 3). A hole is drilled in each leg of the spider on 120° centers, each hole to receive a headed bolt 43. Rotatably mounted on each bolt 43 is a gear 44 in mesh with gear 33. Each gear 44 has an axial hub on which a roller support 45 is clamped. Each roller support carries a centering roller 47 preferably faced with resilient material so as to avoid damaging the brim of the ware, and mounted on a roller bearing to turn easily. Thus, when these centering rollers, that are spaced 120° apart, are simultaneously moved inwardly into engagement with the brim of a plate or the like held on the rotating chuck, they will operate to correct any centering error by shifting the plate to a position concentric with the axis of shaft 4.

I propose to apply to the surface of the ware a plurality of bands, lines or stripes of the same or varying widths and of the same or contrasting colors at a single station or during what may be called a single decorating operation. Thus, the full complement of bands, lines or stripes to be applied to a given piece of ware may possibly be applied in the interval ordinarily required to paint a single band, line or stripe on the ware, thus saving considerable time in the ultimate completion of the decorating operation.

Furthermore, I propose to provide for widening or increasing the thickness or width of the band, line or stripe as it is being applied to the surface of the ware by moving the banding disc in an arcuate path over the surface of the ware and about an axis parallel with the axis of rotation of the ware or the ware chuck. I also propose to provide for making concentric circles or lines on the surface of the ware of the same or varied width and thickness with a single banding disc or wheel. I also propose to provide for making interrupted lines, bands or stripes of the same or varied width or thickness.

The banding disc assembly, three of which are shown herein for the purpose of illustration, are

identical in construction. The banding discs are numbered 48, 49 and 50 for convenience of identification, however, since each of the assemblies are substantially the same, I will describe in detail only the assembly associated with banding disc or wheel 48. Thus, banding disc 48 is carried by a support which includes a shaft 51, Figure 5, mounted for rotation in a tubular sleeve or bearing 52 fixed to the top of rod 53. The banding disc or wheel is demountably clamped on shaft 51 between a disc 55, fixed on said shaft, and a removable disc 56 to be tightened against the banding wheel by nut 57. At the opposite extremity, the shouldered end of the shaft projects beyond the sleeve and has a washer 58 tightened against the shoulder by a nut 59. Only a minimum clearance is allowed between the sleeve end and the washer so as to avoid end play.

Rod 53 is carried by a clamp 60 which is clamped around a tubular sleeve 61, Figure 1, located in front of the chuck and extending at right angles to the axis of the chuck. The banding wheel may be adjusted inwardly toward or outwardly away from the work by loosening clamp 60 and turning it on sleeve 61. The position of the wheel inwardly from the outer rim of the ware can be adjusted by sliding the clamp in along the sleeve to the desired location. The banding wheel may also be adjusted by turning the rod 53 in its socket in clamp 60. It may be tightened in adjusted position by a set screw 62, Figure 3.

Tubular sleeve 61 is mounted on a shaft 63, Figure 6, that is screwed tightly into a tapped hole in a bar 64 welded or otherwise secured to a tubular sleeve 65 arranged at right angles to sleeve 60. Said shaft is shouldered at the opposite end and nut 66 is screwed on the reduced end against a washer 67. The sleeve 61 is rotatable on said shaft and is rotated thereon by means to be later described.

Tubular sleeve 65, Figure 6, is rotatably supported on a shaft 150. The ends of said shaft are reduced and threaded and one end is received in a slot 151, Figure 2, in a frame member 152. The working position of the banding wheel diametrically of the ware may be adjusted by shifting the shaft 150 from one position to another along the slot. The shaft is held in adjusted position by tightening nut 153 against washer 154 thereby clamping the frame between it and another washer 155 fitted against the shoulder formed by the reduced end. A nut 156 and washer 157 on the other end of the shaft limits axial play of the sleeve.

To rotate the sleeve, and to thereby cause the banding wheel to move in an arcuate path across the surface of the ware for widening or broadening a band, stripe or line, an angularly adjustable collar 158 is fitted on the sleeve and is held in position by a set screw 159. The axis of rotation of sleeve 65 is parallel with the axis of rotation of the chuck, whereas the axis of rotation of sleeve 61 is normal thereto. The movement imparted to the banding wheel may be called a traversing motion albeit the path of travel of the banding wheel across the surface of the ware follows an arcuate path having as its center the axis of rotation of sleeve 65.

Collar 158 has a tapped hole 160 therein into which one end of a connecting rod 161 (Figure 2) is screwed. Said rod is connected by a toggle joint 162 to another and extensible rod 68 (Figure 1), extending at right angles thereto and this rod is connected by a toggle joint 69 to a bell

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crank 70 mounted on a post 71 located near the side of the base plate. The other lever arm of the bell crank which is located at another level relative to the other arm, is connected by a toggle joint 72 to a horizontal rod 73 connected to a vertical lever 74 pivoted on the base plate. Said lever has a cam roller 75 attached thereto and at the top has an offset bar 76 through which a stroke adjusting screw 77 is threaded. This screw is adapted to engage a horizontal, stationary stop bar 78 mounted on an upright 79 secured to the base plate. Lever 74 is moved in one direction by a cam 80 fixed on shaft 22 and in the other by a return spring 81. When lever 74 is moved to the left, Figure 1, motion is transmitted through the linkage described to bushing 62 to rotate the same in a clockwise direction as viewed in Figure 2. The action will cause sleeve 57 and consequently banding disc 48 to turn about the axis of rod 63 thus providing the shifting of the banding disc over the surface of ware undergoing decorating. This motion may be employed for widening a stripe or band being applied to the ware or for making concentric circles if the disc is moved back from the surface of the ware while the shift is being made.

Banding wheels 49 and 50 are supported and actuated by apparatus substantially identical with that just described in connection with disc 48. Rather than repeat the description, I have designated those parts which are identical, by the same reference characters as used in connection with banding wheel 48 assembly except in the case of banding wheel assembly 49, have added a prime suffix and in the case of banding wheel assembly 50, have added a double prime suffix.

Thus, in the instance of banding wheel 49, the stop bar 78 is common to both levers 74 and 74' whereas in the case of lever 74'' on the opposite side of the machine, a separate stop bar 82 is provided for limiting the stroke of lever 74''. Also, the slots 151, 151' in member 152 are located at different levels in order to avoid interference between the sleeves 65, 65' and 65'' when shifted from one position to another. The fact that toggle joints of the conventional ball and socket variety are employed to connect the various push rods of each actuating mechanism together will permit horizontal adjustment of sleeves 65, 65' and 65'' in many instances without the necessity for disconnecting the rods.

To move the banding discs in toward the ware and outwardly away therefrom, each clamp 60 has a bent lever 85, depending therefrom provided with an adjustable set screw 86 threaded into the lower end thereof. Said screws are adapted to be engaged by a movable pusher plate 87 that is pivoted at the ends on stub shafts 88 and 89 attached to the machine frame. An extension lever 90, Figure 4, formed integral with one of the ends is for turning the pusher plate on its pivot. Said lever has a cam roller 91 engaging cam 92 on shaft 22. 93 is a return spring. Thus, as cam 92 revolves, pusher plate 87 is moved to the left, Figure 4, to cause the banding discs to be retracted from the surface of the ware, and as the cam lowers lever 90, springs 94, 94' and 94'' move the discs 48, 49 and 50 respectively in toward the ware to be decorated to the limit allowed by set screws 86, 86' and 86''. Thus, an adjustment may be made which will permit one banding wheel to operate before another. Springs 94, 94' and 94'' permit

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the banding discs to move across the surface of the ware without losing contact.

Color may be supplied to the banding wheels in any suitable manner. I have shown herein, more or less diagrammatically, a paint tank 95 having a power driven stirrer thereon from which paint is drawn by a power operated pump 96 and forced through pipe 97 into a header 98 servicing all of the banding discs. From outlets 99, flexible hoses 100, 101 and 102 are connected to paint receptacles 103, 104 and 105, respectively, associated with banding wheels 48, 49 and 50. These receptacles are shaped like wheel guards and are detachably supported from sleeve bearings 52, 52' and 52''. They may, if desired, be provided with drain hoses (not shown) leading back to tank 95. Wipers 106 inside each receptacle clean the radial faces of each banding disc of surplus paint. A separate paint supplying system similar to that shown may be incorporated for plural color work, in which case each banding disc would be separately supplied.

In order to discharge the ware from the machine automatically, a curved trough or chute 107 is positioned in a slot 108 in base plate 1 immediately below chuck 24—25. Thus, when the vacuum is discontinued, the ware will fall off the chuck by gravity onto the curved surface of the chute to be directed thereby to a place of deposit, as for instance, a continuously moving conveyor belt, not shown.

In operation, the operator places a piece of ware against pad 25 in as nearly central position as possible and then trips control lever 21. Upon the commencement of rotation of shaft 22, cam 31 actuates valve 30 to thereby connect passage 26 to a source of vacuum thereby gripping the ware to the chuck. Cam 34 next lowers lever 37 and this causes the centering rollers 47 to engage and center the ware. The cam is developed to provide a motion such that the rollers preferably move into centering position and are then instantly retracted before the banding discs engage the ware.

After the ware has been centered, the banding operation commences. All of the banding discs may be caused to move inwardly simultaneously, by properly adjusting set screws 86, 86' and 86''. On the other hand, one disc may be adjusted so as to move into engagement with the ware before another. This would be most likely to occur if a wide, thick line was being applied by one disc, and a thin line by another requiring less time to apply.

Thus, for the sake of illustration, disc 48 may be operated for making a wide line in the cycle of operations, this disc would engage the ware ahead of the other two discs and after a predetermined amount of rotation of the ware, cam 92 would allow lever 90 to be lowered further to thereby engage discs 49 and 50 either successively or simultaneously with the surface of the ware.

Before or after the engagement of discs 49 and 50 with the work, cam 80 may permit a traversing movement of disc 48 to commence thereby to widen the stripe or line being produced. Cams 80' and 80'' may be set to cause discs 49 and 50 to have a traversing motion imparted thereto after they have moved into engagement with the ware. If a traversing movement is not desired, for any given banding disc, the push rod associated therewith may be disconnected.

When the banding operation has been completed, the banding discs are retracted from the sur-

face of the ware by cams 80, 80' and 80'' and the vacuum valve closed and the ware released from chuck 24—25. When pin 20 engages control lever 21, which has been spring returned to original position, the clutch is disconnected thereby stopping shaft 22.

I claim:

1. Dinnerware lining apparatus comprising, a frame, a vacuum chuck mounted thereon having a vacuum control valve, means for continuously rotating said chuck, movable ware centering means, a plurality of movable lining implements adjacent said chuck, a movable support for each implement, a single carrier upon which all said supports are adjustably mounted, each support being formed for rotation about an axis parallel to the axis of rotation of the chuck and about an axis normal to the first named axis to effect lining operations, means for moving said lining implement including a cam shaft having a rotatable actuating cam thereon for each implement support to move them about one of their respective axes and another rotatable actuating cam, common to all of them for moving them about their other axis, cams also mounted on said cam shaft for actuating said vacuum control valve and said centering means, a drive for said cam shaft, a manually engageable single revolution clutch for controlling the operation of said cam shaft, a source of said paint supply and means for conducting paint from the source to said lining implement.

2. Dinnerware lining apparatus comprising, a frame, a vacuum chuck mounted thereon having a vacuum control valve, means for continuously rotating said ware chuck, movable ware centering means, a plurality of movable lining implements adjacent said chuck, a support for each implement formed for rotation about parallel axes, rotary cam actuated mechanism for operating said vacuum valve, ware centering means and lining implement support, a drive for said cam actuating mechanism and a manually operable clutch for engaging said drive.

3. Dinnerware lining apparatus comprising, a frame, a vacuum chuck mounted thereon having a vacuum control valve, means for continuously rotating said ware chuck, movable ware centering means, a plurality of lining implements adjacent said chuck, a support for each implement formed for rotation about plural axes to effect lining operations, rotary cam actuating mechanism for operating said vacuum valve, ware centering means and implement supports, a drive for said cam actuating mechanism including a manually engageable, single revolution clutch, a source of paint supply and means for conducting paint from the source to said lining implements.

4. Dinnerware lining apparatus comprising, a frame, a vacuum chuck arranged to rotate about a horizontal axis and to support ware substantially vertically, means for continuously rotating said chuck, a centering means for centering ware on said chuck, freely rotatable lining implements adjacent said chuck, a support for each implement mounted for rotation about a horizontal axis parallel to the axis of rotation of said chuck and for movement about a horizontal axis normal thereto to effect lining operations a cam shaft, rotatable cams mounted on said shaft, a source of power, a single revolution clutch between the source of power and the cam shaft for rotating said cam shaft and a manually operable lever for engaging said clutch.

5. Dinnerware lining apparatus comprising, a

vacuum chuck arranged to support ware substantially vertically, means for continuously rotating said chuck, movable means for centering ware on said chuck, a lining implement adjacent said chuck, a support for said lining implement including a member rotatable about a horizontal axis parallel to the axis of rotation of said chuck and a member supporting said first named member rotatable about a horizontal axis normal to the first named axis to effect lining operations and cam actuated mechanism, including a rotatable cam, individual to each element of the support for moving each element about its respective axis.

6. Dinnerware decorating machinery comprising, a frame, a shaft housing supported on said frame, a rotatable shaft in said housing, a vacuum chuck mounted on one end of said shaft, a drive pulley secured to the opposite end of said shaft, means for rotating said shaft including a motor and a drive member connected to said pulley, cam actuated ware centering means adjacent said chuck, a decorating implement located in front of said chuck, a carrier for said implement comprising a member formed with plural parts one of which is rotatable about an axis parallel to the axis of said shaft and another part which is rotatable about an axis normal to the axis of the other part for moving the decorating implement relative to the work, a stationary support for said carrier on which said carrier is adjustably mounted, a rotatable cam shaft, rotatable cams mounted on said shaft for actuating said centering means and the individual parts of said carrier, a drive for said cam shaft including a single revolution clutch and manually operable means for engaging the clutch.

7. Dinnerware lining apparatus, comprising a frame, a rotatable horizontal shaft borne thereby and provided at one of its ends with a chuck for holding a piece of ware in a vertical plane, a support for a lining implement mounted for movement towards and from said chuck, a lining implement mounted on said support, mechanism for rotating said shaft and for moving said implement support towards and from a piece of ware borne by said chuck, and means coordinated with said mechanism for moving said implement support during a lining operation in a direction substantially radial of a piece of ware borne by said chuck to widen a line being applied to the ware.

8. Dinnerware lining apparatus, comprising a frame, a rotatable horizontal shaft borne thereby and provided at one of its ends with a chuck for holding a piece of ware in a vertical plane, a vertically disposed support for a lining implement pivotally mounted at its lower end for swinging its upper end towards and from said chuck, a disc-like lining implement rotatably mounted on the upper end of said support, mechanism for rotating said shaft and for swinging the upper end of said implement support towards and from a piece of ware borne by said chuck, and means coordinated with said mechanism for moving said implement support during a lining operation in a direction substantially radial of a piece of ware borne by said chuck to widen a line being applied to the ware.

9. Dinnerware lining apparatus, comprising a frame, a rotatable horizontal shaft borne thereby and provided at one of its ends with a chuck for holding a piece of ware in a vertical plane, a vertically-disposed lining-instrument support pivotally mounted at its lower end for swinging its upper end towards and from said chuck, and also

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for swinging its upper end towards and from the axis of rotation of said chuck, a lining implement mounted on said support, mechanism for rotating said shaft and for swinging the upper end of said implement support towards and from said shaft, and means coordinated with said mechanism for swinging the upper end of said implement support during a lining operation in a direction substantially radial of a piece of ware borne by said chuck to widen a line being applied to the ware.

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